

COHEN
ACOUSTICAL
INC.

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August 8, 1996

Mr. William Caton
Acting Secretary
Federal Communications Commission
1919 M. Street, N.W. Room 222
Washington, D.C. 20554

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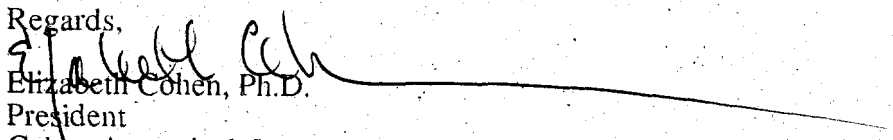
Notice of Ex Parte Meeting
Reference: MM Docket No.87-268

Dear Mr. Caton:

On August 8, Cohen Acoustical, Inc. met with staff in the Commissioner's Mass Media Bureau, Office of Plans and Policy and International Bureau to discuss multichannel, multi-standard digital audio solutions. Also attending the meeting were representatives from Motorola, Inc. and the National Telecommunications Information Administration.

A copy of the material presented is attached.

Regards,


Elizabeth Cohen, Ph.D.
President
Cohen Acoustical, Inc.

cc: Saul Shapiro

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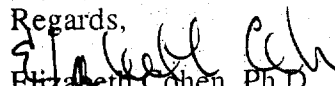
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Introduction to Audio Compression and Coding

What is the Current Standard?

- **Current CD quality digital audio requires 1.5 million bits/sec.**
- **Current standard for broadcasting is analog.**
Significantly lower quality in dynamic range, frequency response
- **ATSC proposal is to provide at least CD quality audio.**
384 kilobits/sec. 5.1 channels, CD equivalent sound

- **Compression can mean better quality audio at any given digital data rate.**
- **With Compression technology, you can deliver CD quality STEREO at 150 kHobits/sec.**
 - **1/10th the number of bits required by current LPCM (CD's)**
 - **Sounds equal or superior to CD.**
- **Compression allows you to provide higher quality at lower bit rates.**
- **Compression allows you to offer more channels.**

- **Improved Compression Technologies will offer**
 - **Better quality**
 - **More Channels**
 - **Use of less bandwidth**
 - **Multiple languages**
- **Because you will need fewer and fewer bits , you can offer other services.**
- **Compression Technology has not reached its zenith.**

- **It is technically feasible and highly desirable to permit implementations of innovations in Compression technology.**

WHY?

- **Utilization of Bandwidth as efficiently as possible is important.**
- **Bandwidth is one of our most valuable resources.**
- **An open platform standard will improve the utilization of bandwidth.**
- **Bandwidth is a valuable public asset . Compression Techniques are improving at rates that will enhance the efficiency and flexible use of the spectrum.**
- **Innovation and Competition will assure that the public resource is utilized as efficiently as can be.**
- **Efficient Use of bandwidth is in the public interest.**
- **An open platform will make provision of services an open market.**
- **The artists in the creative community know that the medium will evolve. They do not want to be stuck/limited by a static system.**

- **No compression algorithm developer will claim that they have reached the peak of efficiency.**
- **Increased Coding efficiency of a factor of 2 is probable if not inevitable.**
- **It is not unreasonable that within a few years that the efficiency of compression algorithms will double. It is highly likely that we could achieve transparency at 75 kilobits/sec.**
- **Double, Twice the efficiency
i.e. instead of 5 channels you could have 10**

1992/3: 4:1 compression

1996: 10:1

2000: 20:1

- **If we lock in a standard, then we will have wasted half the audio bandwidth.**

- **We have not reached the end of the line, imagine the possible innovations.**
- **Don't lash broadcasting down with buggy whip limitations.**

- **The public has come to expect CD quality in the home and in the car and are already attending theatrical venues where the sound quality is better than CD quality.**
- **There is an expectation of quality that already exists and is growing. This quality will be delivered at low cost by other media that broadcasting will compete with.**
- **Ex. DTS is delivering 5.1 channels of 1.5 megabits on CD's today.**
- **Audio formats anticipate 20 bits, 5 to 8 to N channels .**
- **Special format presentations such as 3D sound(already integral to multi-media computing) would not be excluded by an open platform approach.**

The DTV Open Platform Standard

- **The essence of digital technology: programmability.**
- **Transmission of the algorithms decode the digital audio along with the audio data.**
- **The standard specifies a minimum platform capability, not a specific use of that capability.**
- **This is a flexible standard that provides a structure for current manufacturers with the essential feature of future backward compatibility, yet it takes into account the rapid ongoing technical innovation of the digital era.**
- **The single most important feature of this proposed standard is that it makes compatibility with the other new media practical.**

"NARAS, wishes the Commission to take into consideration that Advanced Television Systems will afford musicians, composers and vocalists the opportunity to offer the performance of their creative intellectual property to the general public in a PRISTINE manner never possible prior to the introduction of the Advanced Televisions Systems."

"It is of the utmost importance that whatever standard is chosen, that such a standard possess an OPEN WINDOW to allow the introduction of new technologies that these musicians, composers, and vocalists may wish to utilize in the creation, performance and presentation of their intellectual property."

"By so doing, the Commission will further competition among the developers of the technology and will further the competition among musicians, composers and vocalists as to the use of these new technologies resulting in an ongoing improvement in the delivery of audio relative to the Advanced Television Systems and ultimately more competitive pricing to the consumer."

"Whatever standard is chosen, it must not stifle the creative spirit of American musicians, composers and vocalists whose product has become one of this nations leading export items. The window must be left OPEN to meet the musical and technological challenges of the 21st century."

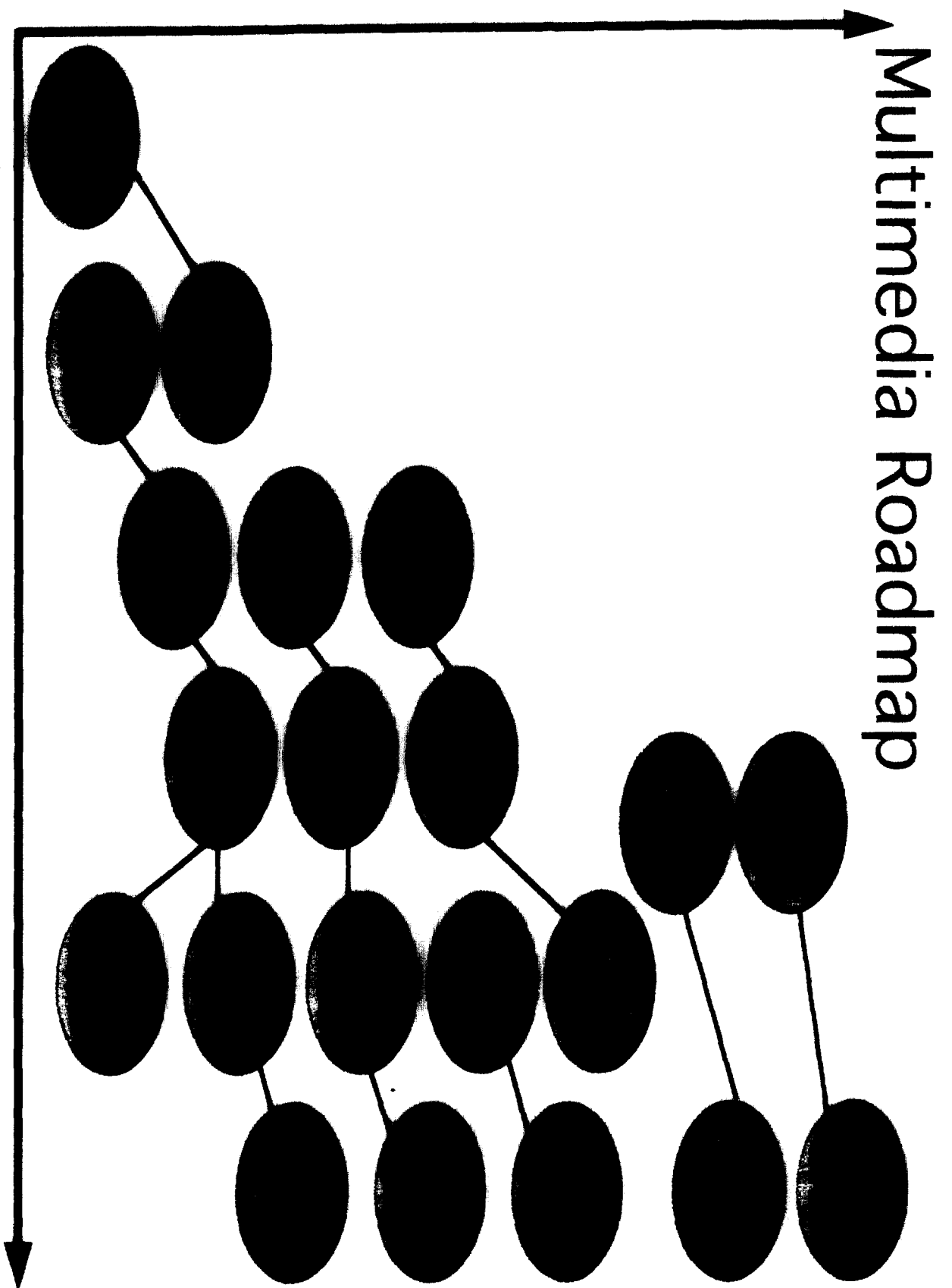
Multimedia – Setting the Standard

Roger Kozlowski

**Vice President & Technical Director,
Advanced Consumer Segment
Motorola Semiconductor Products, Inc.**



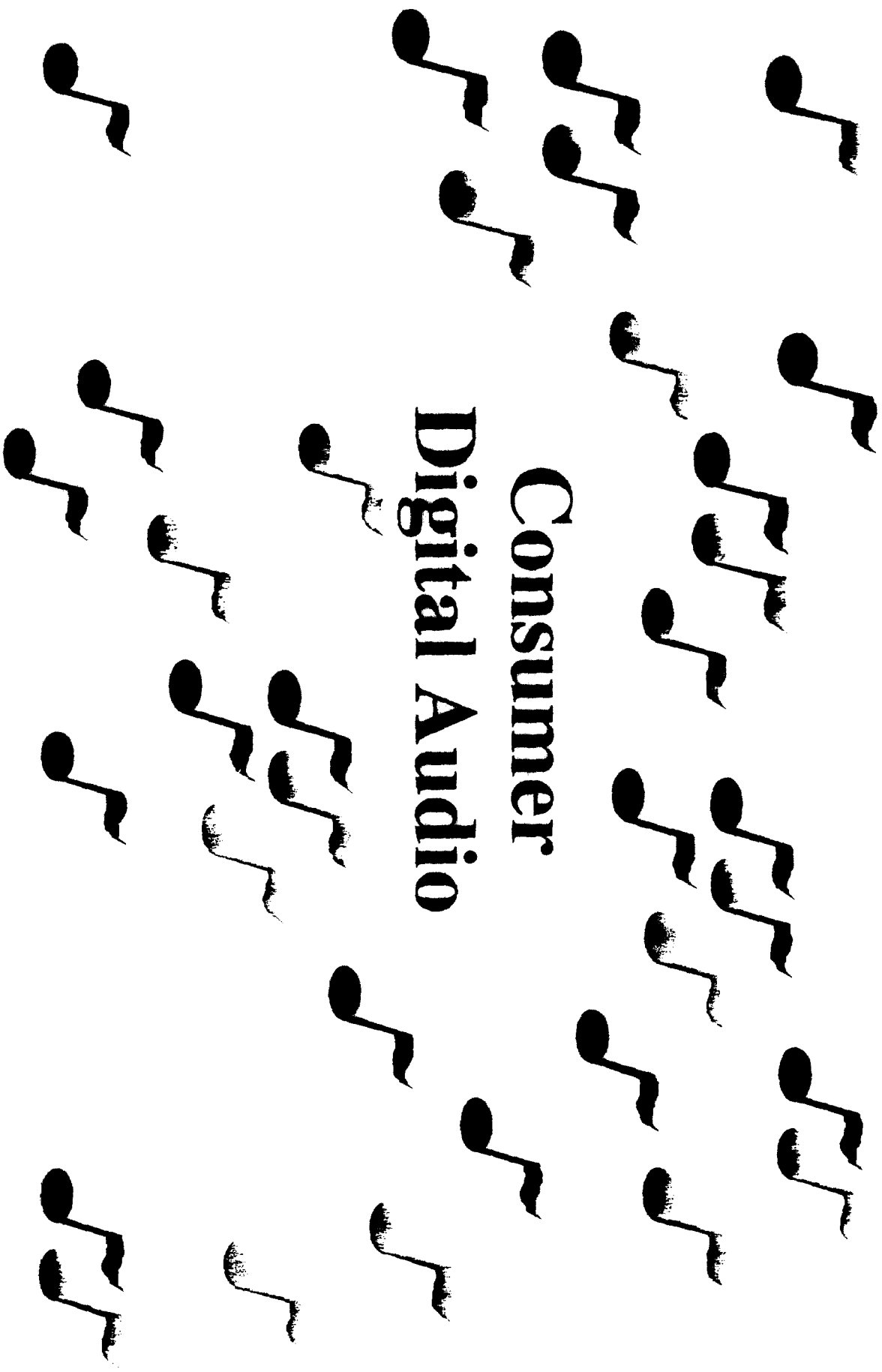
MOTOROLA

[illegible]

μ **MOTOROLA**
Digital Signal Processing
Division

40p

Consumer Digital Audio



“Bringing Professional Audio Home”

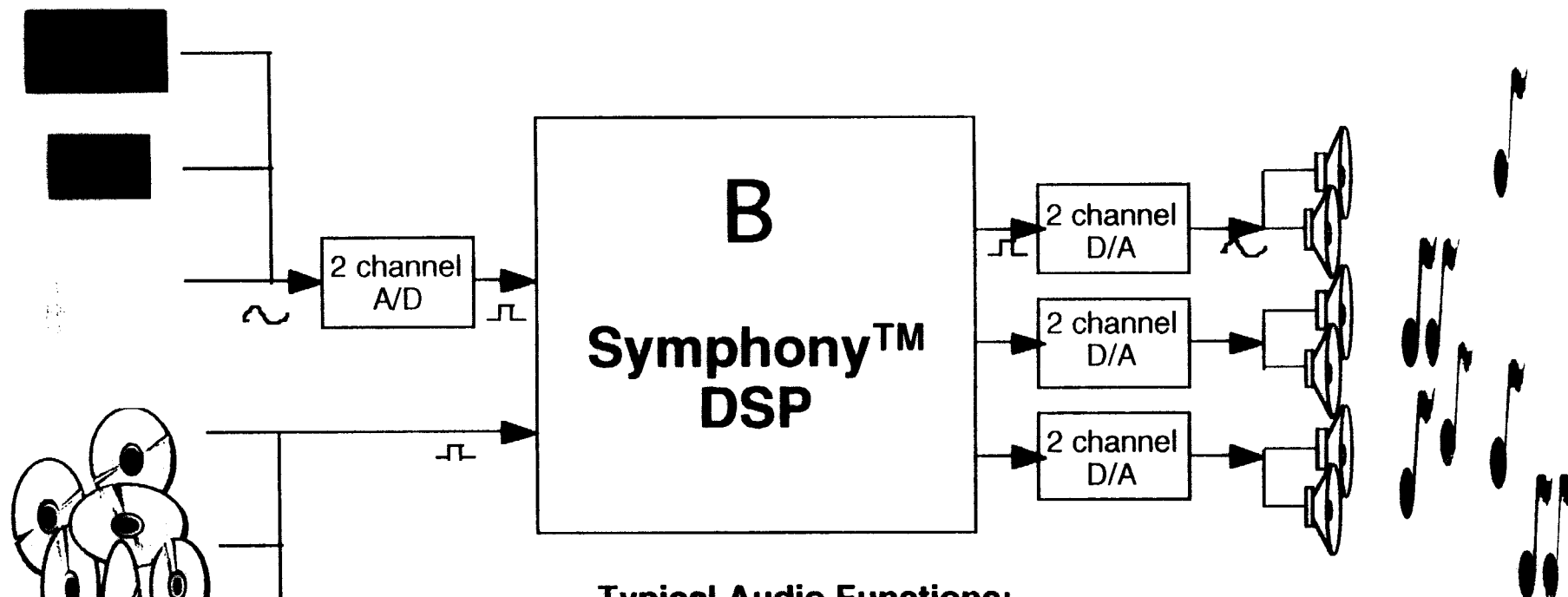
- **The 24-bit DSP56000 is the 'de facto' standard for professional audio and is used for mastering:**
 - music, movies & games
- **Cooperate with audio technology developers to develop the highest quality software implementations.**
 - Dolby Laboratories: ProLogic, AC-3 Surround
 - Lucasfilm Ltd.: Home THX, Home THX 5.1
 - DTS Coherent Acoustics™
 - SRS Labs, Inc: SRS
- **Provide a family of audio specific Symphony™ DSPs for a variety of low cost consumer applications.**
 - DSP56004, DSP56004ROM, DSP56007, DSP56009, DSP56010/11
- **Provide hardware reference designs for demonstration, prototyping & improving customer time-to-market.**
 - DSP56007EVM & DSP56009EVM
- **Allow flexibility for customers to differentiate products with value added features.**



Consumer Audio Solutions

<u>Product</u>	<u>B Silicon</u>	<u>Licensable Software</u>
Televisions	DSP56004	Dolby ProLogic SRS Labs SRS
	DSP56009	Dolby AC-3 Surround
Audio/Video Receivers	DSP56004	Dolby ProLogic Soundfield Effects
	DSP56007	Lucasfilm Home THX
	DSP56009	Dolby AC-3 Surround DTS Coherent Acoustics™
Digital Versatile Disk Players	DSP56009	Dolby AC-3 Surround
	DSP56011/10	MPEG1/2 PCM
HDTV	DSP56009	Dolby AC-3 Surround
	DSP56011	MPEG 1 Layer 2 Audio
PC Games	DSP5600x	Crystal River Engineering AudioReality™

Symphony™ System Implementation



Typical Audio Functions:

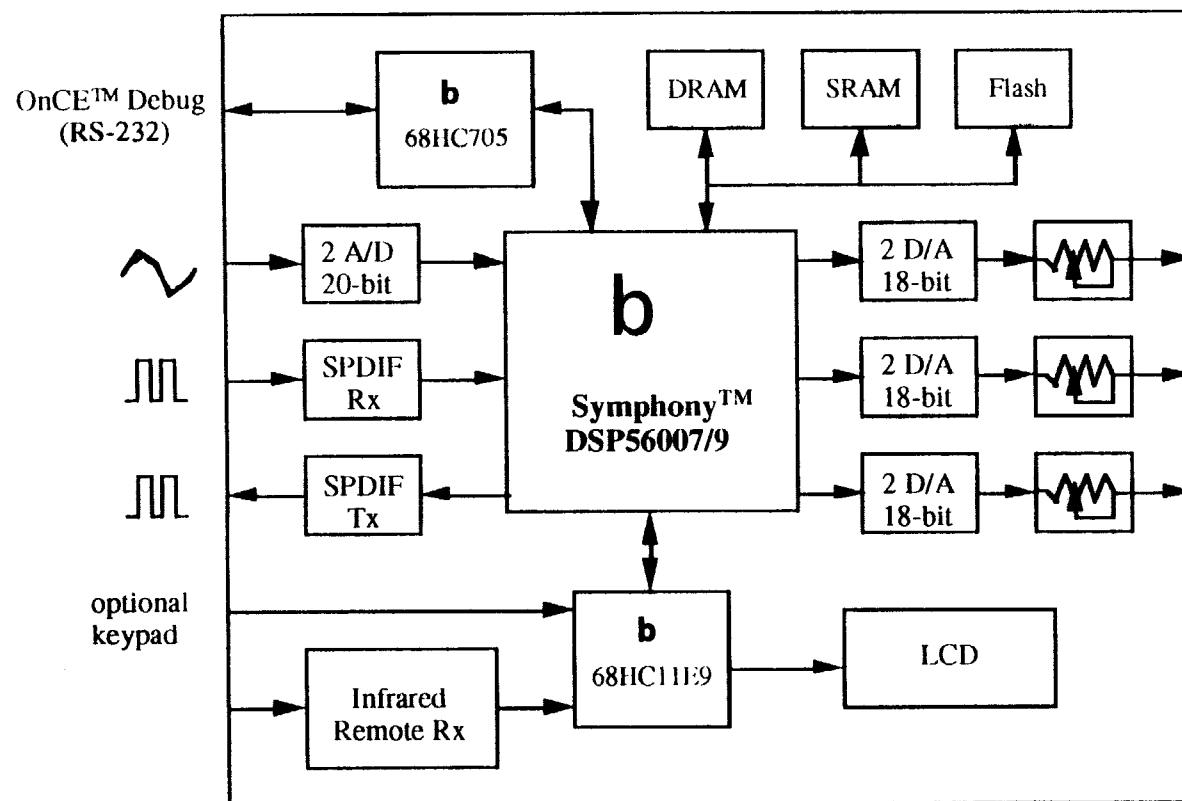
- Dolby AC-3 Surround
- Dolby ProLogic
- Lucasfilms Home THX
- DTS Coherent Acoustics™
- SRS Labs SRS
- Crystal River Eng AudioReality™
- MPEG1/2
- Soundfield Effects
- Graphic equalization
- Tone/Volume/Balance
- Pulse Code Modulation

Laser Disk
Compact Disk
DVD



Symphony™ DSP56007/9 EVM

Consumer Audio Evaluation & Prototyping Platform



FEATURES

24-Bit Symphony™ DSP56007/9

- DSP56007 operating @ 66 MHz
or
- DSP56009 operating @ 80 MHz

8192 Bytes of off-chip SRAM

8192 Bytes of non-volatile RAM

30-pin SIMM slot for easy DRAM expansion

MC68HC11E9 Microprocessor

MC68HC705 Microprocessor for RS-232-to-OnCE port
command conversion

Four input channels with stereo 20-bit A/D

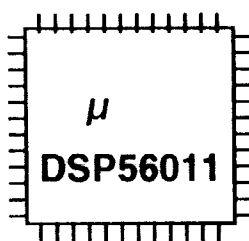
Six output channels with **three** stereo 18-bit D/A

SPDIF/CP340 Transformer

2x16 character user interface LCD

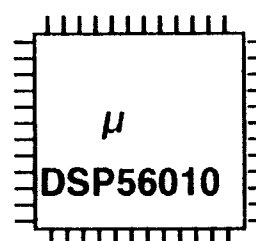
DVD Audio Solutions - DSP56011/10

US Version
5.1 Channel



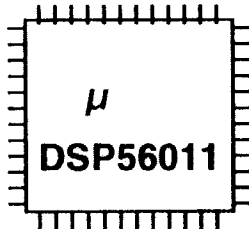
- AC3 Surround@448kbps
- MPEG1 layer 2
- PCM
- PES
- Executive S/W

US Version
2 Channel



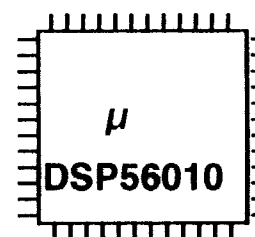
- AC3 2 channel
- MPEG1 layer 2
- PCM
- PES
- Executive S/W

Europe Version
5.1 Channel



- MPEG2 5.1 channel
- MPEG1 layer 2
- PCM
- PES
- Executive S/W

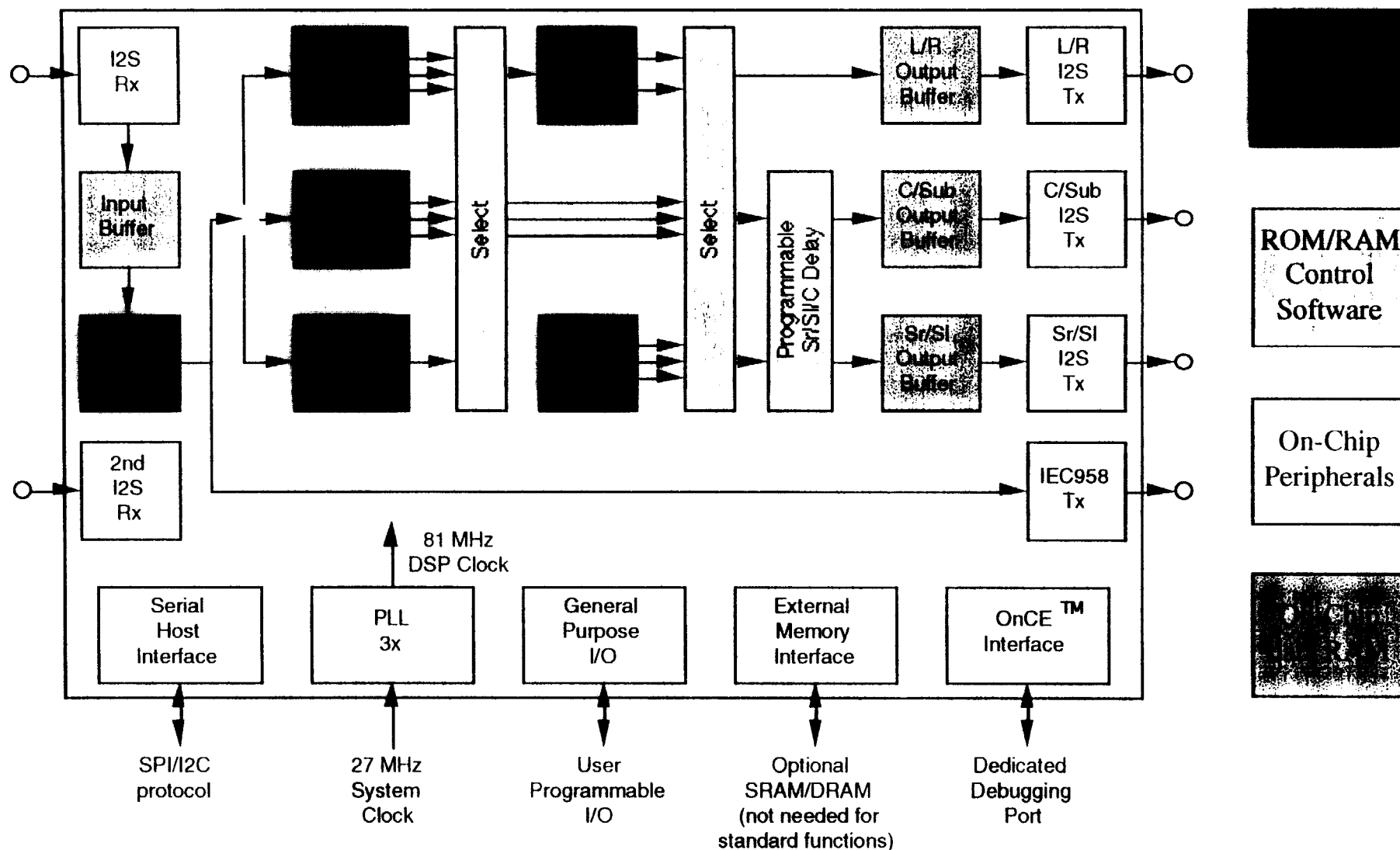
Europe Version
2 Channel



- MPEG2 2 channel
- MPEG 1 layer 2
- PCM
- PES
- Executive S/W

- All products are pin compatible 100pin TQFP (14 x 14mm)

DSP56011 DVD Functionality



DSP56011 Benefits for DVD

- Highest quality 24-bit audio decoding algorithms.
- No external memory required for all standard DVD features such as Dolby AC3 Surround.
- Integrated IEC958 eliminates external component.
- No extra DSP clocking required . Runs from 27MHz DVD system clock.
- Flexible implementation adapts to customer specific needs:
 - Executive control code allows integration of user features.
 - Reallocation of resources (MIPS/RAM) for custom algorithms.
 - User programmable general purpose input/output pins
 - Dedicated OnCE simplifies system debug